MAPS, MAP READING, AND LAND NAVIGATION

LESSON 1: INTRODUCTION TO MAPS

PURPOSE

Knowing how to read and understand maps are valuable skills that can strengthen your awareness of the world around you. Your effective use of maps requires a basic understanding of them, their scales, symbols, and colors. The first lesson in this chapter introduces you to this information and explains how to **orient** a map by matching **manmade** or natural features with map symbols. The next lesson of this chapter shows how this basic information compares to what you find on **topographic maps**.

bar scales
contour lines
contrast
elevation
intermittent
landforms
legend
man-made
marginal information
orient
prominent
relief
terrain
topographic maps

INTRODUCTION

Maps are in common use throughout the world today. For instance, when a family takes a vacation, a map is used to guide the driver from one city to another. The airline pilot and the sea captain use special charts or maps from which to navigate. Rarely do experienced navigators become lost. Instead, they apply their map reading abilities to read, understand, and use maps effectively.

Have you ever found yourself on the wrong road or in the wrong neighborhood? If you asked for directions in this situation, were you told, "Go right," or "Turn left"? After following these directions for a few blocks, the question arises, "Turn right ... where?" These types of situations call for map reading skills.

DEFINITION OF A MAP AND MAP READING

A map is a line drawing of a portion of the earth's surface, as seen from above. Obviously any attempt to plot each feature to its exact shape and scale would result in a map too big to read. Therefore, maps are drawn "to scale" with each set measurement on the scale representing a set amount of the earth's surface.

In general, maps provide information about the existence and location of man-made and natural features; show distance, **elevation**, and different types of **landforms**; and depict man-made and natural features by the use of symbols, lines, colors, and forms or shapes.

There are many different types of maps. However, the most common types are:

- city or state road maps
- geographic maps/atlases
- topographic maps.

City or state road maps, also known as tourist maps, provide information on street names, important buildings, route numbers, distance, transportation centers. In many cases, they include the location of recreational or historical areas, as well.

Geographic maps show an overall view of the mapped area in relation to climate, population, **relief**, and/or vegetation. An atlas is a collection of geographic maps of regions, countries, continents, or the world. These maps are generally not as accurate as city or state maps. And compared to topographic maps, their accuracy is significantly inferior, therefore, they should be used for general information only.

Topographic maps show **terrain** and landforms in a manner which can be measured. They also show the horizontal positions and elevations of these features. Elevation on these maps is normally indicated by vertical **contour lines**. Topographic maps are the ones most commonly used in the military. Beginning with the next lesson, we will examine topographic maps in detail and will use them throughout the remainder of this unit so that you can begin to understand how to read and use them.

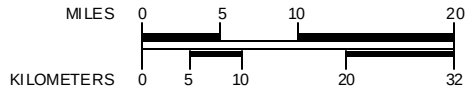
ROAD MAPS

MARGINAL INFORMATION

You can compare a map to any piece of equipment — before you use it, you must first read the instructions. Most mapmakers place the instructions on a map (known as the **marginal information**) around the outer edge of a map. All maps are not the same, so it is necessary to read the marginal information carefully every time you use a different map. The following discussion describes and illustrates the most commonly used elements of marginal information that are found on road maps.

- Sheet or Map Name. Whenever possible, a map is named after the most **prominent** cultural or geographic feature in that area (For example, Orlando or the Official Transportation Map for the State of Florida). Although the most prominent feature on the map may be a state or other large geographical region (for example the Mid-Atlantic States), the map sheet normally contains numerous inserts of smaller sections in order to show them in more detail. These inserts can be found around the margin or on the reverse side of the map sheet.

- Bar Scales. **Bar scales** are special rulers used to measure ground distance on a map. Although these scales may vary with each road map, the most common units of measurement are miles and kilometers. Shown below is an example of a scale used on the Official Transportation Map for the State of Florida.



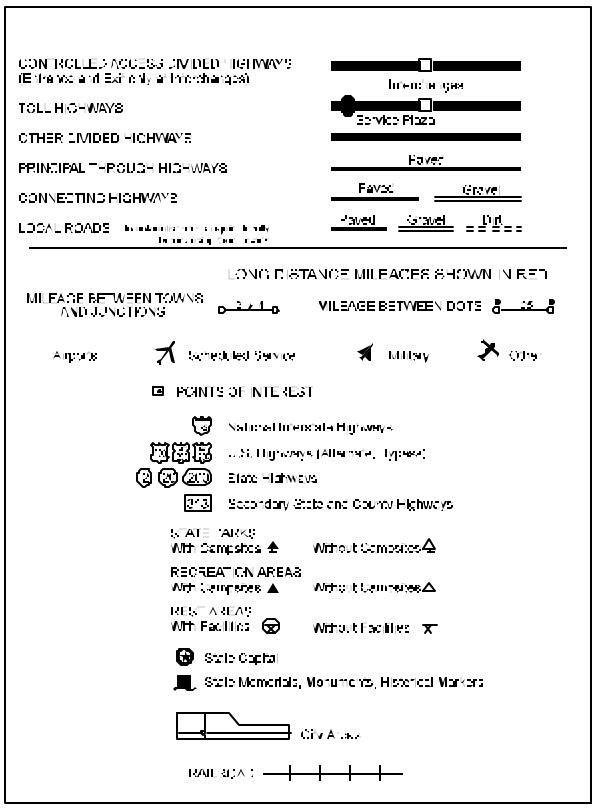
One Inch equals 12 Miles or 19 Kilometers

- Printing Note. This note indicates the agency responsible for printing the map. The printing date determines when the map information was obtained, not when the map was printed.

- Legend. The **legend** is part of the mapmaker's dictionary. It is a shorthand method of illustrating and identifying mapped features using symbols to show some of the more prominent features on the map. These symbols are not the same on every road map.

MAP SYMBOLS

Since all features on a map cannot represent their true position and shape, map-makers must use symbols to represent these features. These symbols are made to look as closely as possible like the actual features themselves as they are seen from above. The legend indicates the meanings of the symbols that are used on a map. A few of the commonly used symbols that you will find on road maps are identified below.



⇒ Roads: Indicated by parallel or solid lines. Thickness and color of these symbols indicate the road size.

⇒ Interchanges: Indicated by a heavy solid line for major access roads and parallel lines for intersecting secondary roads. Legends also illustrate full, partial, and no access at these interchanges.

⇒ Railroads: Commonly shown by single or parallel lines with horizontal tick marks.

⇒ Buildings: Symbols for buildings may vary from map to map according to the purpose of the map or building. Schools and churches are commonly represented by a solid square with a flag or cross affixed. Hospitals may be shown by a cross. Universities and colleges may sometimes have a special symbol as a point of interest.

⇒ Points of Interest: Indicated by a special marking and its name; for example, a historical marker.

⇒ Airports: Normally shown by a picture of an airplane.

⇒ Water Features: Normally shown in blue and take the approximate shape of the feature.

⇒ Special Features. Significant natural features (forests, recreational areas, national monuments, etc.), military reservations, or Indian reservations are normally high-lighted with a specific color and do not have a standard shape. Many road maps also have a chart indicating the services that are available at the recreational areas and parks shown on the map.

You may also find the following symbols on road maps that can provide helpful information to you when using the map.

⇒ Route Markers: Represented by a shield or some other shape containing the number of the road in its center. Although the map may show these route markers with white numbers and/or letters on a black shield or shape, the actual colors of the signs as seen on the highway are indicated below.

Interstate Highways

- Principle Routes: Red, white, and blue signs with one- or two-digit numbers. East-west routes have even numbers (I-4 or I-70), whereas north-south routes have odd numbers (I-5 or I-95).
- Loop or Belt Routes: Red, white, and blue signs with three-digit numbers; the first number is always even (I-295). These routes circle or bypass major cities.
- Spur Routes: Red, white, and blue signs with three-digit numbers; the first number is always odd (I-580). These routes lead into major cities.
- Business Routes: Green signs marking routes from principal, loop, or belt highways that go to or through cities.

⇒ Boundary Symbols: Shown as broken or **intermittent** lines which vary in pattern to denote different boundaries (for example between counties, states, or time zones).

⇒ Mileage Markers: Shown between towns and road junctions or between dots with the mileage indicated in red or black (see the example in the illustration on the preceding page). State and regional maps also show long distance mileage between major cities by printing that information in red (with red directional arrows), and centering it between the two cities. An example of this long distance mileage indicator may appear as follows:

TAMPA
199 Miles
320 Kilometers
WEST PALM BEACH

⇒ Official Highway Mileages: This chart shows the actual ground mileage between the major cities that are located on the map.

⇒ City/Street Names: This information lists alphabetically (wherever space permits on the map — including on the reverse side of it — and printed adjacent to its corresponding feature) the names of cities on state and regional maps and the names of streets on city maps. Beside each city or street listing is a letter/number code (for example, D-9). Along the outer edge of the margin are letters ranging from "A" to "P" (or beyond) and numbers ranging from "1" to "15" (or beyond). Note that the letter "I" is usually omitted so as not to be mistaken for the number "1."

The following example shows how to locate features on a road map using this letter/number code. **Note:** For this example, our map sheet will have the letters along the vertical (left and right) edges of the margin and the numbers along the horizontal (top and bottom) edges. To find the feature at D-9, use a finger on one hand to locate the letter "D" — it should be close to the top left or top right edges of the map. Next, use a finger on your other hand to locate the number "9" across the top or bottom margin. Now, move both fingers in from the margins toward the map. Where they meet is the general location of the feature. Street names may still be hard to find on a cluttered map, but you have narrowed the search to a specific area.

⇒ Special Traffic Regulations/Traffic Control Devices: This section contains some of the traffic regulations and/or signs (control devices) used within the state that may be different from other states within the region.

DID YOU KNOW?

It is the motorist's responsibility to know the regulations and meanings of all control devices within the region in which he/she is driving. *Ignorance is not an acceptable excuse under the law*.

MAP COLORS

Colors on a road map provide **contrast** to map features, making them easier to identify. Map symbols are usually printed in different colors with each color identifying a class of features. However, colors may vary from one map to another. When used differently, mapmakers indicate these colors and their uses in the marginal information.

Described below are the basic colors used on most road maps and the features they represent. Occasionally, mapmakers may use other colors to indicate special information.

- Black: Indicates the majority of man-made features: *buildings or roads*.
- Blue: Identifies water features: *lakes, swamps, or rivers*.
- Brown: Identifies elevation and relief features: *mountain ranges*.
- Green: Identifies vegetation: *woods, grassland, brush, orchards, or vineyards*.
- Red: Classifies man-made features: *populated areas, main roads, special features, or boundaries on older maps*.

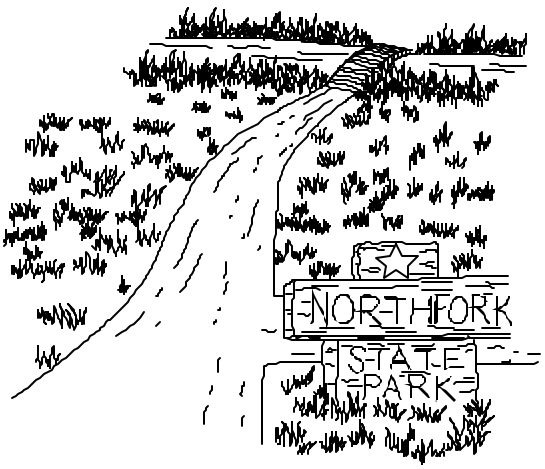
ORIENTING A MAP

Finding your way requires the ability to read and interpret a map, compare it to the features on the ground, and move to the desired location. One method of comparing your map to the ground is to orient it so that the map symbols fit the location of the features as they appear on the ground. A properly oriented map can also indicate direction; that is, after you have it correctly oriented to the ground, the top of it will usually point toward the north.

The following situation shows you how to orient a map without using a compass.

* * *

While participating in a bike rally, Barry traveled off the main road and became lost. He knew for certain he was lost when he came upon the main entrance to *North Fork State Park* on his right. Across from this entrance was a small bridge which crossed the *North Fork River*. Since Barry had a route map for this bike rally, he took the following steps to orient it.



- First, Barry determined his location using at least two known points. He chose to use the man-made features of the bridge and the park entrance and the natural feature of the river.

- Next, he located these same features on his map. With the map in a horizontal position, he rotated it until the symbol for the river was pointed in the same direction as (or aligned with) the river in front of him.

- Barry then checked to ensure that the park entrance was correctly aligned with its actual location. Since from his location the park entrance was located on the right side of the road, he checked to see if the map symbol for the park entrance was also on the right side of the road.

With his map properly oriented, he realized what direction he had to take to rejoin the bike rally.

* * *

In many cases, orienting a map may mean turning it upside down or holding it with one of its edges pointing toward you. Holding a map like this may make it harder for you to read street names or other symbols, but it properly aligns the features on the ground with those on the map. Then, once you know where you are (by using the two or more known points discussed in the above story), keep the map oriented until you are at your destination or in an area familiar to you.

The next time you are on a trip to a place where you have never been before, try this method. *It works!* You will be able to navigate your way to your destination much more easily.

CARE OF MAPS

Since you may have to keep a map for a long time, exercise a lot of care when using it. Three important considerations in the care of maps are:

- Properly refold it after each use.

- Use a pencil if it becomes necessary to mark on it so that you can easily erase those marks.

- Avoid spilling liquids on it.

GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) is a high-tech worldwide radio-navigation system formed from a network of 24 satellites and their ground stations. GPS provides more precise and efficient methods of surveying and mapmaking. Today, GPS makes it possible to accomplish the same work in a fraction of the time. Mapping is the science of using GPS to pinpoint locations and then create maps of any location in the world, including both natural and man-made features.

CONCLUSION

Maps permit you to see an area of the earth's surface with the key features of that area properly positioned. They can take the guesswork out of traveling to new locations preventing wasted time and effort. Therefore, make the most of your trips — know how to read and understand your maps beforehand. Even the best maps are useless if you do not know how to properly use them.

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